10th Class 2018

Chemistry	Group-II	Paper-II
Time: 1.45 Hours	(Subjective Type)	Marks: 48

(Part-I)

2. Write short answers to any FIVE (5) questions: 10

(i) Write two properties of irreversible reactions.

Ans Following are two properties of irreversible reactions:

1. These reactions are proceed to completion.
2. No sign of equilibrium state occurs in these reactions.

(ii) How atmospheric gases are used in manufacture of chemical?

Ans Nitrogen is an atmospheric gas. It is used to make ammonia. It is widely used to provide an inert atmosphere, a process known as "blanketing", principally to execute oxygen. Nitrogen is used in this way in food packaging, glass making, etc. Oxygen is also an atmospheric gas, which is used in chemicals as well as in manufacture of copper and lead.

(iii) Write chemical equilibrium constant for given equation:

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$$

Ans The rate of forward reaction $R_f = K_f [H_2] [I_2]$

The rate of reverse reaction $R_r = K_r [HI]^2$

The equilibrium constant expression

$$K_c = \frac{[Product]}{[Reactants]}$$

$$K_c = \frac{[HI]^2}{[H_2][I_2]}$$

(iv) What is complete reaction? How it is represented?

Ans "A complete reaction is one in which all reactants have been converted into products."

Most of the reactions, in which the products do not recombine to form reactants, are called irreversible reactions. They are supposed to complete and are represented by putting a single arrow (→) between the reactants and products.

(v) Write two properties of bases.

Ans Following are the two properties of bases:

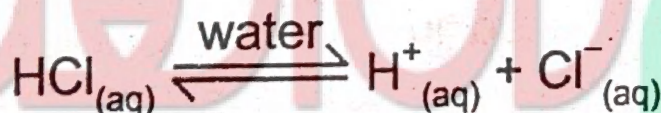
1. Bases have bitter taste and feel slippery, *e.g.,* soap is slippery to touch.
2. They turn red litmus blue.

(vi) According to Arrhenius, define acid, with an example.

Ans According to Arrhenius concept:

Acid is a substance which dissociates in aqueous solution to give hydrogen ions.

Example:

$$HCl_{(aq)} \xrightleftharpoons{water} H^{+}_{(aq)} + Cl^{-}_{(aq)}$$

(vii) Write two properties of salts.

Ans Following are two properties of salts:

1. Salts are ionic compounds found in crystalline form.
2. They have high melting and boiling points.

(viii) Write the two uses of sodium carbonate.

Ans Following are two uses of sodium carbonate:

1. It is used for the manufacture of glass, detergents.
2. It is also used for the manufacture of pulp and paper and other chemicals.

3. Write short answers to any FIVE (5) questions: 10

(i) Define functional group.

Ans An atom or group of atoms or presence of double or triple bond which determines the characteristic properties of an organic compound is known as the functional group. The remaining part of the molecule mainly determines the physical properties such as melting point, boiling point, density, etc.

For example, –OH group is the functional group of alcohols, which gives characteristic properties of alcohols.

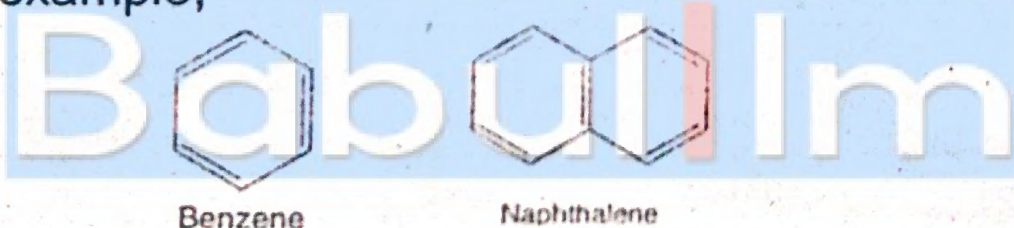
(ii) Write classification of coal.

Ans

Types of Coal	Carbon Contents	Uses
Peat	60%	It is inferior quality coal used in kiln.
Lignite	70%	It is soft coal used in thermal power stations.
Bituminous	80%	It is common variety of coal used as household coal.
Anthracite	90%	It is superior quality hard coal that is used in industry.

(iii) What are aromatic compounds? Give one example.

Ans These organic compounds contain at least one benzene ring in their molecule. A benzene ring is made up of six carbon atoms with three alternating double bonds. They are called aromatic because of aroma or smell they have. For example,

Benzene   Naphthalene

They are also called benzenoid compounds.

(iv) Why are alkenes reactive?

Ans Alkenes are reactive compounds because the electrons of the double bond are easily available for reaction. These compounds have the tendency to react readily by adding other atoms, to become more saturated compounds. As a result, the double bond is converted into a single bond that is more stable.

(v) Give two uses of ethene.

Ans Ethene is used:

(a) for artificial ripening of fruits.

(b) as a general anaesthetic.

(vi) Give two characteristics of monosaccharides.

Ans Following are two characteristics of monosaccharides:

1. They are soluble in water and have sweet taste.
2. They cannot be hydrolyzed.

(vii) What is the significance of vitamins?

Ans Vitamin plays an important role in the healthy development of our body. Natural vitamins are organic food substances found only in plants and animals. Vitamin cannot be assimilated without ingesting food. That is why, it is suggested that vitamins must be taken with meal.

(viii) How you justify RNA works as a messenger?

Ans It is a single stranded molecule. It is responsible for putting the genetic information to work in the cell to build proteins. Its role is like a messenger.

4. Write short answers to any FIVE (5) questions: 10

(i) Write the composition of dry air.

Ans **Composition of dry air:**

Gas	% by volume
Nitrogen	78.09
Oxygen	20.94
Argon	0.93
Carbon dioxide	0.03

(ii) What are primary and secondary air pollutants?

Ans Primary air pollutants are the waste products driven out because of the combustion of fossil fuels and organic matter *e.g.*, SO_2, SO_3, CO_2, CO, etc.

While secondary pollutants are produced by various reactions of primary pollutants *e.g.*, sulphuric acid, nitric acid, etc.

(iii) Write two effects of ozone depletion.

Ans Following are two effects of ozone depletion:

(i) Due to the depletion of ozone in the atmosphere, infectious diseases like malaria are increasing.

(ii) It can also change the life cycles of the plants by disrupting the food chains.

(iv) **Write two disadvantages of hard water.**

Ans Following are the two disadvantages of hard water:

1. Hard water consumes large amount of soap in washing purposes.
2. Drinking hard water causes stomach disorders.

(v) **What is capillary action?**

Ans Capillary action is the process by which water rises up from the roots of plants to leaves. This process is vital for the survival of the land plants.

(vi) **Define metallurgy.**

Ans The process of extraction of metal in a pure state on a large scale from its ore by physical or chemical means is called metallurgy.

(vii) **Write name of any two fractions of petroleum.**

Ans Name of two fractions of petroleum are:
Petroleum Gas, Diesel oil.

(viii) **What role is played by pine oil in the froth flotation process?**

Ans Pine oil enhances the non-wet ability of mineral particles by water and hence makes them easier to go at the surface of froth.

(Part-II)

NOTE: Attempt any TWO (2) questions.

Q.5.(a) State the law of mass action and how chemical equilibrium constant is helpful in prediction of direction of reaction? (5)

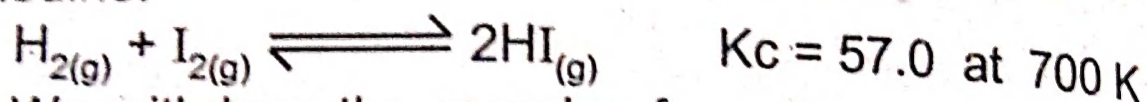
Ans **State Law of Mass Action:**

This law states that "The rate at which a substance reacts is directly proportional to its active mass and the

rate of reaction is directly proportional to the product of active masses of the reacting substances."

Predicting Direction of a Reaction:

Direction of a reaction at a particular moment can be predicted by inserting the concentration of the reactants and products at that particular moment in the equilibrium expression. Consider the gaseous reaction of hydrogen with iodine.

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)} \qquad Kc = 57.0 \text{ at } 700\text{ K}$$

We withdraw the samples from the reaction mixture and determine the concentrations of $H_{2(g)}$, $I_{2(g)}$ and $HI_{(g)}$. Suppose concentrations of the components of the mixture are:

$$[H_2]_t = 0.10 \text{ mol dm}^{-3} \quad [I_2]_t = 0.20 \text{ mol dm}^{-3} \text{ and } [HI]_t = 0.40 \text{ mol dm}^{-3}$$

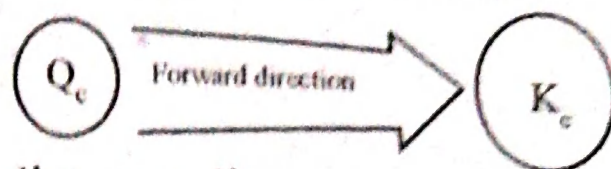
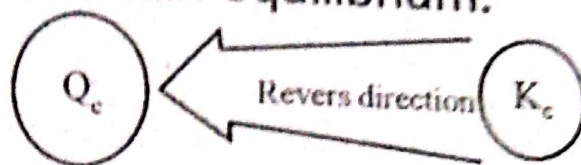
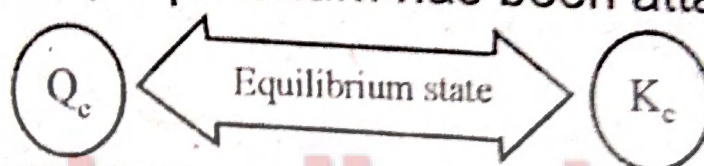
The subscript 't' with the concentration symbols means that the concentrations are measured at some time t, not necessarily at equilibrium. When we put these concentrations into the equilibrium constant expression, we obtain a value called the reaction quotient Q_c. The reaction quotient for this reaction is calculated as:

$$Q_c = \frac{[HI]_t^2}{[H_2]_t [I_2]_t} = \frac{(0.40)^2}{(0.10)(0.20)} = 8.0$$

As the numerical value of Q_c (8.0) is less than K_c(57.0), the reaction is not at equilibrium. It requires more concentration of product. Therefore, reaction will move in the forward direction.

The reaction quotient Q_c is useful because it predicts the direction of the reaction by comparing the value of Q_c with K_c.

Thus, we can make the following generalization about the direction of the reaction.

If $Q_c < K_c$; the reaction goes from left to right, *i.e.*, in forward direction to attain equilibrium.

If $Q_c > K_c$; the reaction goes from right to left, *i.e.*, in reverse direction to attain equilibrium.

If $Q_c = K_c$; forward and reverse reactions take place at equal rates, *i.e.*, equilibrium has been attained.

(b) Write the uses of any four bases. (4)

Ans For Answer see Paper 2018 (Group-I), Q.5.(b).

Q.6.(a) Give five physical properties of alkanes. (5)

Ans For Answer see Paper 2017 (Group-I), Q.6.(a).

(b) Explain the sources and uses of carbohydrates. (4)

Ans For Answer see Paper 2015 (Group-II), Q.7.(a).

Q.7.(a) How is urea manufactured? Explain with flow sheet diagram. (5)

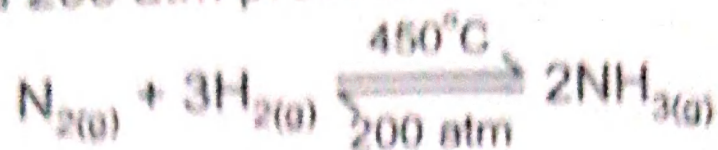
Ans **Manufacture of Urea:**

Urea is nitrogenous fertilizer. It consists of 46.6% nitrogen. It is white crystalline compound, highly soluble in water. It is used for the manufacturing of important chemicals, but its major (about 90%) use is as a fertilizer.

Raw Material:

The raw materials for the manufacturing of urea are:
(i) Ammonia (NH_3) (ii) Carbon dioxide (CO_2)

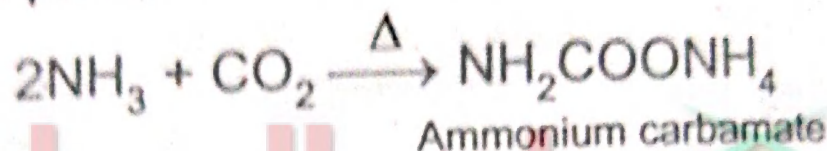
Ammonia is prepared by the "Haber's process". One volume of nitrogen (from air) and three volumes of hydrogen (obtained by passing methane and steam over heated nickel catalyst) is passed over iron catalyst at 450°C and 200 atm pressure.

$$N_{2(g)} + 3H_{2(g)} \underset{200\ atm}{\overset{450^\circ C}{\rightleftharpoons}} 2NH_{3(g)}$$

Process:

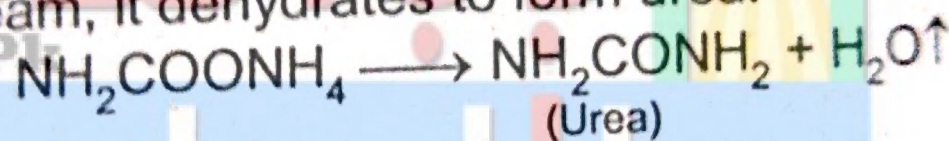
Manufacturing of urea involves three stages:

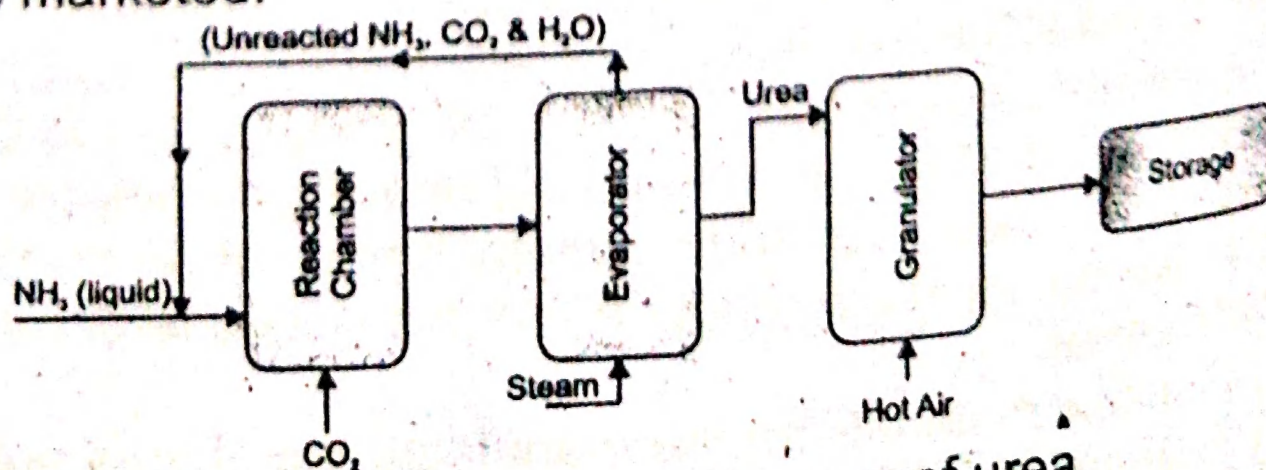
(i) Reaction of ammonia and carbon dioxide:

Carbon dioxide is passed through liquid ammonia under high pressure to form ammonium carbamate

$$2NH_3 + CO_2 \xrightarrow{\Delta} \underset{\text{Ammonium carbamate}}{NH_2COONH_4}$$

(ii) Urea formation:

When ammonium carbamate is evaporated with the help of steam, it dehydrates to form urea.

$$NH_2COONH_4 \longrightarrow \underset{\text{(Urea)}}{NH_2CONH_2} + H_2O\uparrow$$

(iii) Granulation of urea:

At this stage, liquid urea is evaporated to form granules. When liquid urea is sprayed from top of a tower under pressure and a hot current of air is introduced from the base, it evaporates to form granules. This is stored to be marketed.

This is flow sheet diagram of urea.

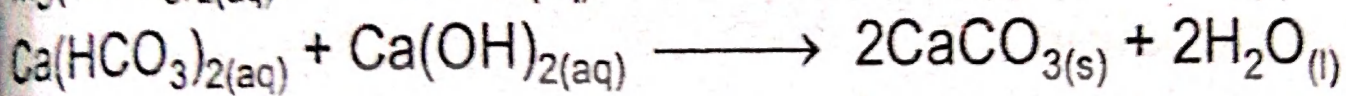
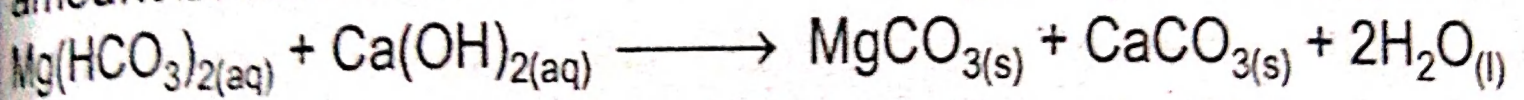
(b) How temporary hardness of water can be removed? Explain. (4)

Ans There are two methods for the removal of temporary hardness of water:

(a) Clark's method:

A chemical method to remove temporary hardness is by the addition of slaked lime $Ca(OH)_2$. A calculated amount of lime water is added to temporary hard water.

$$Mg(HCO_3)_{2(aq)} + Ca(OH)_{2(aq)} \longrightarrow MgCO_{3(s)} + CaCO_{3(s)} + 2H_2O_{(l)}$$

$$Ca(HCO_3)_{2(aq)} + Ca(OH)_{2(aq)} \longrightarrow 2CaCO_{3(s)} + 2H_2O_{(l)}$$

Thus, once the magnesium and calcium ions precipitate out, water becomes soft.

(b) By boiling:

Temporary hardness of water is easily removed by boiling water. On boiling, calcium bicarbonate $Ca(HCO_3)_2$ decomposes to produce insoluble calcium carbonate, which precipitates out of the solution.

$$Ca(HCO_3)_{2(aq)} \xrightarrow{\Delta} CaCO_{3(s)} + H_2O + CO_{2(g)}$$